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CS 3210

Exercise 7

Ch 6 – Problem Set #1

*What are the arguments for and against representing Boolean values as single bits in memory?*

In favor of storing Boolean values as a single bit, this choice in theory saves memory. Only a single bit is need to represent the data. However, arguing against this choice, most machines cannot address a single byte, so a software implementation is needed to store Boolean values this way. If these values are stored in the smallest addressable memory unit, no special implementation is needed, but more memory is used than is in theory necessary.

Ch 6 – Problem Set #2

*How does a decimal value waste memory space?*

A decimal value wastes memory because it often uses more bytes than necessary to represent real numbers. With Binary Coded Decimals, each digit is represented exactly typically using 4 bits. Theee bits are not sufficient to store digits 0-9 so at least 4 bits must be used. But 4 bits can represent 16 digits, so there is essentially storage available that is never used. Floating point numbers use every bit in their allotted size to store a value, though often the exact value cannot be represented. In this way use less space than decimal values.

Ch 6 – Problem Set #7

*What significant justification is there for the -> operator in C and C++?*

Ch 6 – Problem Set #10

*Multidimensional arrays can be stored in row major order, as in C++, or in column major order, as in Fortran. Develop the access functions for both of these arrangements for three-dimensional arrays.*

For a 0-based 3D array of dimensions n x m x p (e.g. int[][][] arr = new int[n][m][p]) :

Row major:

addr(arr[i][j][k]) = addr(three[0][0][0]) + (k\*(n + m) + (i \* n + j) \* element\_size

Column major:

addr(arr[i][j][k]) = addr(three[0][0][0]) + (k\*(n + m) + (j \* m + i) \* element\_size

Ch 7 – Problem Set #4

*Would it be a good idea to eliminate all operator precedence rules and require parentheses to show the desired precedence in expressions? Why or why not?*

Ch 7 – Problem Set #5

*Should C’s addinging operations (for example, +=) be included in other languages (that do not already have them)? Why or why not?*

Ch 7 – Problem Set #9

Ch 7 – Problem Set #10

*Show the order of evaluation of the expressions of Problem 9, assuming that there are no precedence rules and all operators associate right to left.*

Ch 7 – Problem Set #13